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ABSTRACT

In Ontario, mothers and their preterm or full-term infants were observed at home when the infants were 8 and 12 months of age. At each visit, the Bayley Scales of Infant Development were administered, and after each visit, observers completed the Maternal Behavior Q-Sort and Ainsworth ratings of maternal sensitivity. Maternal sensitivity and infant attachment security scores were derived from these measures. When the infants were 18 months old, mothers and infants were videotaped in the Ainsworth strange situation procedure. Results indicated that maternal sensitivity scores from the home visit at 8 months correlated with infant attachment security scores from the visit at 12 months. Sensitivity scores from the visit at 12 months correlated with security scores from the Maternal Behavior Q-Sort. Ainsworth ratings were correlated with Q-Sort measures of maternal sensitivity. There were no significant differences between dyads with preterm and full-term infants in maternal sensitivity or infant attachment security at the 12-month visit. Nor were there differences in attachment classifications in the strange situation procedure at 18 months. (BC)

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Maternal Sensitivity and Attachment Security: Concordance of Home- and Lab-Based Measures

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Ainsworth, Bell & Stayton (1971) reported that mothers of infants classified as securely attached in the strange situation were rated as more sensitive during earlier home observations than mothers of anxiously attached infants. Maternal sensitivity was assessed by ratings that had extensive behaviorally based anchors for the odd points on a 9-point scale. The magnitude of the effect size was considerable - about a 2.5 SD difference between the secure and anxious groups in the ratings of maternal sensitivity. Subsequent studies using Ainsworth's ratings that have reported smaller but significant differences (e.g., Egeland & Faber, 1984; Grossmann, Grossmann, Spangle, Suess, & Unzner, 1985) or non-significant differences (e.g., Goldberg, Perrotta, Minde, & Corter, 1986; Mangelsdorf, Gunnar, Kestenbaum, Lang, & Andreas, 1990). In addition to these empirical inconsistencies, the Ainsworth ratings reduce rich observational discernment about maternal motives and behaviour in response to infant communicative signals to a single score. Thus the multidimensional aspects of maternal behaviour leading to a given rating are lost. We (Pederson, Moran, Sikto, Campbell, Ghesquire, & Acton, 1990) developed a q-sort procedure that was designed to describe maternal behaviour in more detail as well as provide an overall summary of maternal sensitivity.

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Preterm and full term infants were subjects in the present study. We were interested in the development of infant-mother attachment relationships in a preterm sample because preterm birth is associated with more stress (e.g., Pederson, Bento, Chance, Evans & Fox, 1991) and preterm infants present more caregiving difficulties (e.g., Goldberg & DiVitto, 1983). Thus, we reasoned, individual differences in infants and mothers predictive of subsequent individual differences in attachment security would be easier to observe in the preterm dyads. Obviously all parents experience stress, however individual differences within a sample of low risk infants may be predominantly below a minimum threshold where stress may impede parental responsiveness. We (Moran & Pederson, 1992) assumed that the stresses associated with preterm birth may be above this hypothesized threshold and thus create more observable individual differences in maternal responsivity to infant social cues.

METHOD

Subjects. Mothers of preterm and full term infants were recruited in the hospital shortly after the infants' births. The preterm infants were selected from the local NICU on the basis of birth weight less than 2000 grams

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and gestational ages less than 37 weeks and the absence of gross neurological or physical anomalies at birth. Infants with birth anomalies were also excluded from the full term group. The birth and demographic background of these two groups are summarized in the following table:

	Preterm Sample N = 42 (SD)	Full Term Sample N = 35 (SD)	
Gestational Age (in weeks)	28.7 (3.69)	39.9 (1.29)	$t(75) = 18.53$, $p < .001$
Birth Weight (in grams)	1190.6 (432.62)	3420.5 (452.50)	$t(75) = 23.66$, $p < .001$
Days in Hospital	64.0 (36.16)	3.5 (1.39)	$t(75) = 9.10$, $p < .001$
Maternal Age	28.5 (5.11)	29.1 (5.12)	n.s.
Maternal Education (in years)	13.2 (2.39)	14.5 (2.67)	$t(75) = 2.23$, $p < .05$
Paternal Education (in years)	13.21 (2.85)	14.7 (2.96)	$t(75) = 2.20$, $p < .05$

Procedures. Two observers conducted home observations the infant-mother dyads at eight and twelve months of age (ages for the preterm infants were corrected for weeks of prematurity). Each visit lasted approximately 2 hours. At the eight month home visits Bayley Scales of Infant Development (Bayley, 1969) were administered with the baby on mother's lap followed by an interview with the mother. The interview provided a context in which the mother's attention was divided between the responding to the questions and to her infant's needs. After the visit, the observers summarized their observations with a brief narrative description, the Maternal Behaviour Q-sort (Pederson, Moran, et al., 1990)), and the Ainsworth ratings of maternal sensitivity (Ainsworth, et al., 1971). Similar procedures were used at the twelve-month home visits. The Bayley scales were administered by one observer with the infant in a high chair while the mother in completed the Attachment Behaviour Q-sort (Waters, 1986) under guidance of the second observer. This was followed by a maternal interview. The observers summarize the visit by brief narrative description, the Maternal Behaviour Q-sort, Attachment Behaviour Q-sort, and Ainsworth maternal sensitivity ratings.

At 18 months the dyads were videotaped in Ainsworth strange situation (Ainsworth, Blehar, Waters, & Wall, 1978). The strange situations were conducted at 18 months because strange situations are harder to code at 12 months for preterm infants because of delays in motor development.

The q-sort observations were summarized by generating a maternal sensitivity score for the Maternal Behaviour Q-sorts and a security score from the Attachment Behaviour Q-sorts by correlating the observed q-sort with the respective criterion sorts. There was high inter-observer agreement for the sensitivity (r's > .92) and the security (r = .94) scores. Sensitivity scores

from the 8-month visit correlated .71 with sensitivity scores from the 12-month visit (See Figure 1). The observers' security scores correlated with security scores generated from the mothers' Attachment Behaviour Q-sorts r = .56, $p < .001$)

RESULTS

Prediction attachment security at 12 months. Sensitivity scores derived from the 8-month home visits correlated .61 ($p < .001$) with the security scores derived from the observers' 12-month home observations (see Figure 2) and .32 ($p < .05$) with security scores from the mothers' q-sorts. Maternal sensitivity scores from the 12-month visit correlated .53 ($p < .001$) with the security scores from the mothers' q-sorts. The Ainsworth ratings were highly correlated with the q-sort measures of maternal sensitivity and produced a pattern of correlations with the attachment security scores similar to the q-sort sensitivity scores. The above correlations were very similar within the preterm and full term groups.

Prediction of the attachment relationship at 18 months. The means and standard deviations for the various measures of maternal sensitivity and attachment security are summarized in the following table (the anxious-avoidant and anxious-resistant subgroups were averaged since there are no predictions of differential maternal sensitivity or attachment security between these two groups):

Q-sort score or Ainsworth sensitivity rating	Preterm Group		Full Term Group		F's(1, 38) for Birth Group X Security Interaction
	Secure N = 8 (SD)	Anxious N = 11 (SD)	Secure N = 12 (SD)	Anxious N = 11 (SD)	
Sensitivity 8 -months	.06 (.41)	.04 (.42)	.53 (.33)	.18 (.43)	2.24, n.s.
Sensitivity 12-months	.07 (.51)	.07 (.57)	.48 (.41)	-.30 (.34)	6.87, $p < .05$
Attachment Security 12-M	.08 (.39)	.03 (.41)	.36 (.32)	-.20 (.19)	5.56, $p < .05$
Sensitivity Ratings 12-M	4.6 (3.1)	4.7 (2.9)	7.0 (2.0)	3.3 (1.5)	7.01, $p < .05$

Preterm infants experienced significantly less sensitive caregiving as assessed during the 8-month home visit (F (1,38) = 5.37, $p < .05$). There were no significant differences between preterm and full term groups in assessments of maternal sensitivity or attachment security at the 12-month visit. There were no differences between the two birth groups in the frequency of attachment classifications at the 18-month strange situation assessment. The home observations of sensitivity and attachment security were not related to strange situation attachment security classifications for the preterm infant-mother dyads, but were related for the full term infant-mother dyads. (The means relevant to these analyses are also presented graphically in Figure 3.)

Security scores derived from the mothers' q-sorts were not related to strange situation classifications for either birth group.

DISCUSSION

These data provide striking examples of coherence and of incoherence in the development of infant-mother attachment relationships. For both preterm and full term dyads, attachment security scores that summarize home based observations from observers and from mothers are predicted from observations of maternal sensitivity four months earlier. The magnitude of these correlations are substantial using observer descriptions of attachment behaviour. The lower magnitude of maternal based attachment security scores may be due to, among other reasons, (a) mother's inexperience with the complexities of the q-sort procedures, (b) individual differences in maternal knowledge about their infants' behaviours (presumably sensitive mothers would have better knowledge), (c) sampling errors from the limited observation time for the observers, (d) observer q-sort scores are based upon an aggregation of two q-sorts, whereas there is only one maternal q-sort, thus there may be more measurement error in the mothers' scores.

Observers' descriptions of maternal sensitivity and attachment security from the 12-month visit were strongly related to the secure (i.e., Group B) versus anxious (i.e., Group A or C) classifications derived from the strange situation six months later, but only for the full term dyads. The effect sizes are all 1.75 SD or greater. Not only is there no coherence between earlier home observations and attachment security at 18 months for the preterm dyads, the distributions for the secure and anxious groups are virtually overlapping. We anticipated that individual differences in the development of infant-mother relationships would be more coherent for the preterm group. At this point, we are not certain how to account for these group difference in coherence of development. We note that Goldberg, et al. (1986) also failed to find a relation between home based ratings of maternal sensitivity and strange situation assessments of attachment security with a preterm sample. We also have data that we have not yet reported from a previous sample of preterm infants in which home observations did not predict strange situation classifications. Thus we have confidence that although these differences in coherence were not predicted they are probably genuine and repeatable findings.

The explanation for these differences cannot rely on simple explanations such as greater incoherence in the preterm group since there were no substantiative differences in the magnitude of the correlations between the 8- and 12-month home observations between the two birth groups (in fact the correlations for the preterm group tend to be slightly higher than for the full term group). Also questions about the validity of the strange situation classification for preterm infants do not seem reasonable since we have data that show that anxious preterm infants are related to high parenting stress scores, than the secure preterm infants or either secure or anxious full term infants. (Since the secure-anxious differences within the preterm group are systematically related to other data, it is difficult to dismiss the validity of those differences.) Fortunately we have extensive information about these families and we are currently examining our records in a family by family basis to develop hypotheses that might account for these birth group effects.

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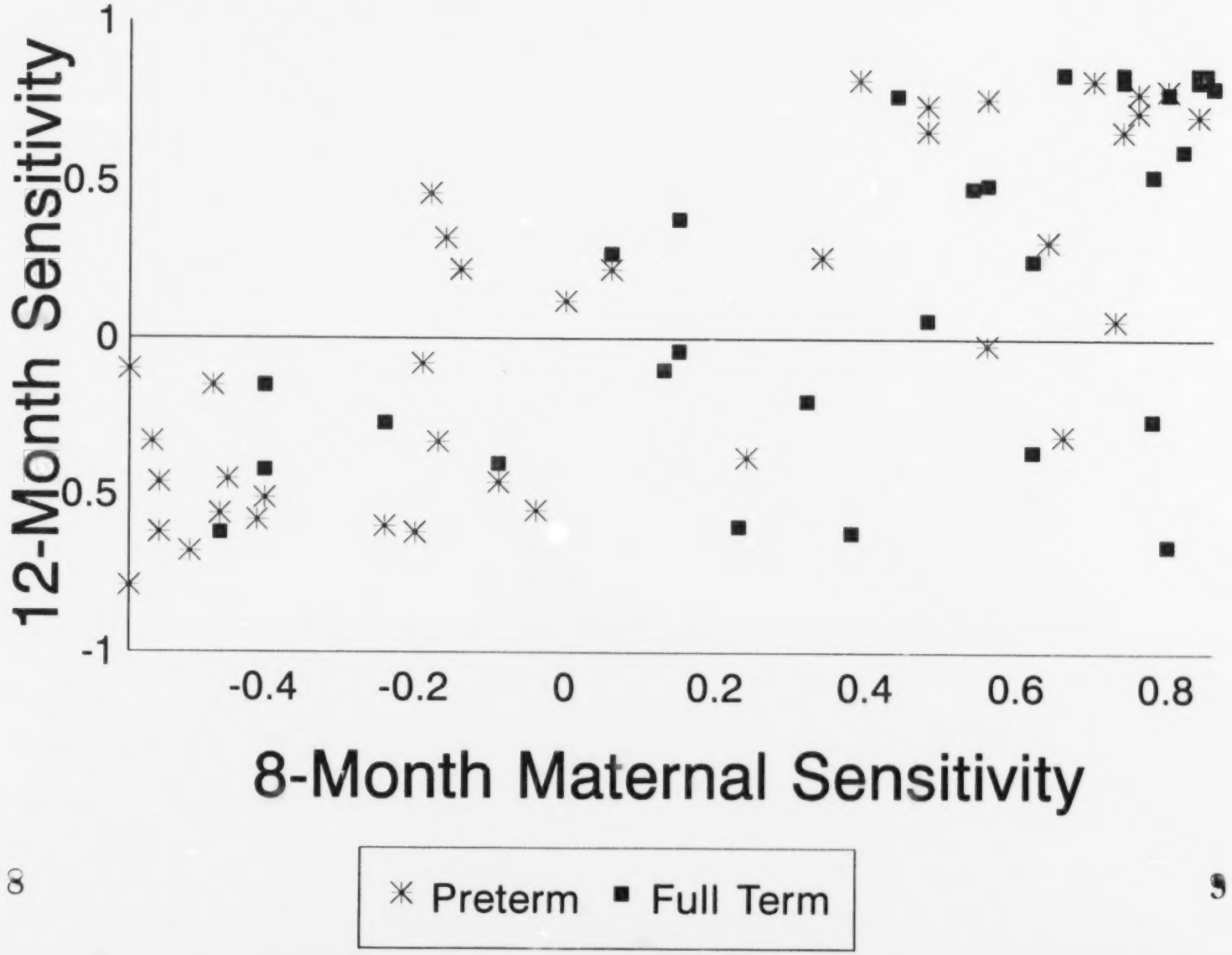
FIGURE TITLES

Figure 1. Scatter plot of maternal sensitivity q-sort scores at 12 months as a function of maternal sensitivity scores at 8 months ($r = .71$, $p < .001$).

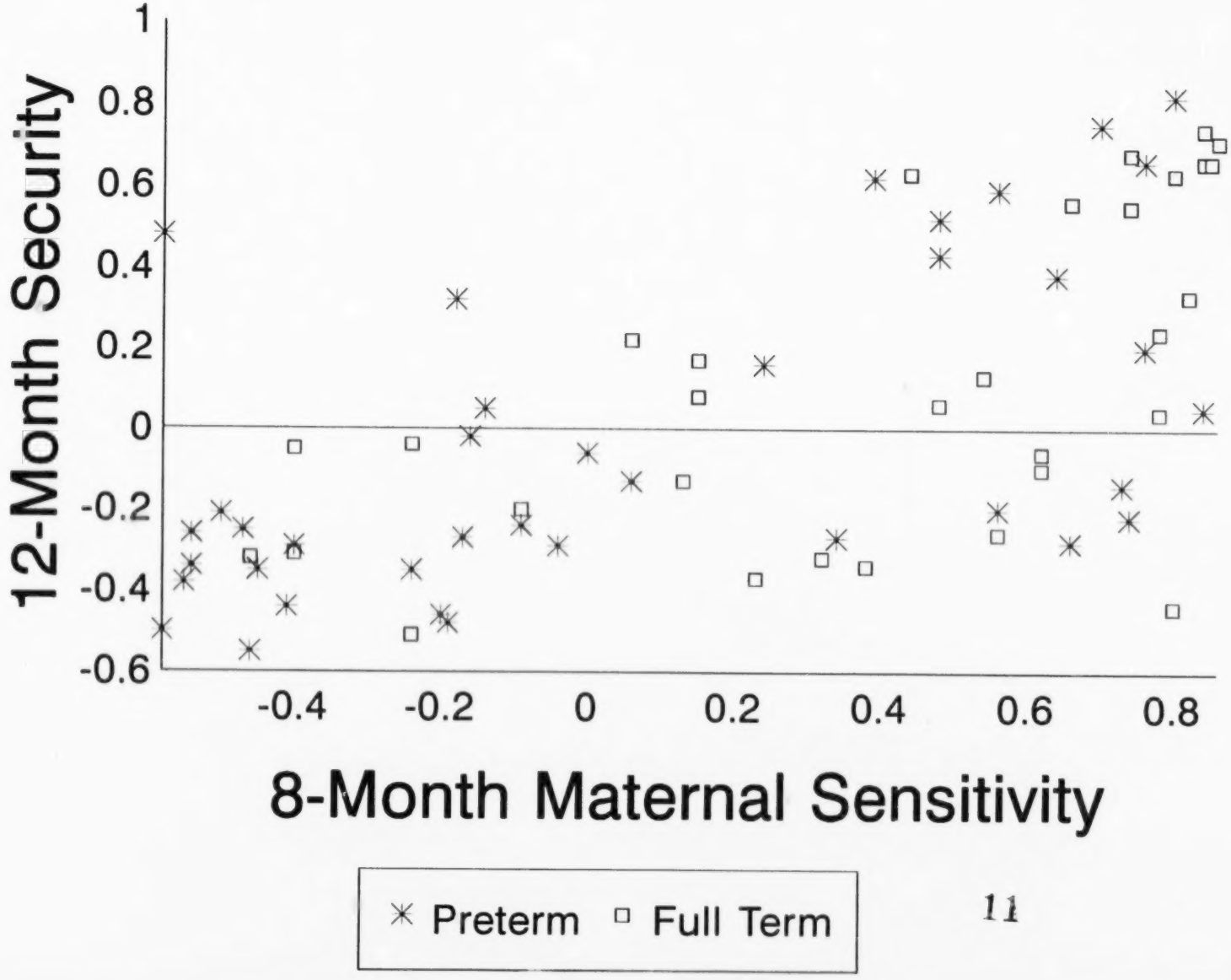
Figure 2. Scatter plot of attachment security scores at 12 months as a function of maternal sensitivity scores at 8 months ($r = .61$, $p < .001$).

Figure 3. Maternal sensitivity scores (at 8 and 12 months) and attachment security scores (at 12 months) for full term and preterm secure and anxious dyads (at 18 months).

Maternal Sensitivity at 8 and 12 Months



Attachment Security and Maternal Sensitivity



Q-sort data from Full Term - Preterm Study

Strange Situation Assessment at 18 Months